INTRODUCTORY ADD

OF

MEDICAL EDUCA

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of U[illegible] College

By Professor E. A. S[illegible]
Jodrell Profe[illegible] of P[illegible]

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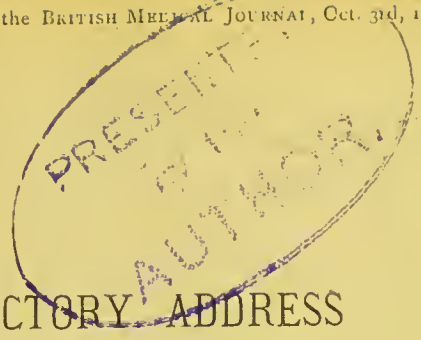
[Reprinted for the Author from the British Medical Journal, Oct. 3rd, 1885.]



INTRODUCTORY ADDRESS

ON

MEDICAL EDUCATION.

Delivered at the opening of the Winter Session of the Medical Faculty of University College.

By Professor E. A. SCHÄFER, F.R.S.,
Jodrell Professor of Physiology in the College.

It has long been the custom to inaugurate the commencement of each academic year of the Medical School of University College by an introductory address delivered by some member of the teaching staff to the students of the faculty, old and new. In some of the medical schools of the metropolis, the custom is now honoured more in the breach than in the observance, and it is possible that this may soon be the case here also; for there are those among us who regard this function as an anachronism—harmless enough, perhaps, but productive of no particular benefit, and therefore a thing to be got rid of. I must even admit that I have myself been constantly on the side of the abolitionists. An engagement is not likely to be less successfully fought because it has not been preceded by a fanfare of trumpets, and the work of a session is not likely to suffer because it is begun without a corresponding introductory flourish. No doubt there are a few things to be said in favour of these addresses; they are not entirely barren. They undoubtedly afford a convenient occasion of formally welcoming into our ranks those who have determined to cast in their lot with us, and of reassembling those who have already pursued a portion of their studies in our school; and they also give the person who is deputed to deliver the address an opportunity of bringing before the world his views upon some subject connected with medical science. On the other hand, there is a chance that these views, interesting as they may be to the author himself, may prove somewhat less interesting to his audience; and, even at its best, the address is neither more nor less than a "lecture"—that is to say, an addition to the ever increasing burden which the modern student of medicine is compelled to bear, in obedience to the oftentimes illogical but always legalised commands of the licensing corporations. Whether, however, we approve or not of the system, the fact remains that I am here to give you an address, and you are here to listen to it; so the sooner we begin the better. The utmost I can do is to promise to be as brief as possible.

In the first place, then, it is my duty and pleasure to welcome, in the name of my colleagues, the new faces that I see amongst you. The selection of a particular school in which to follow the study of medicine must always be a difficult matter for those who are ignorant of the relative advantages offered by the several schools. Those who are here present have probably already made their selection, and it is

unnecessary for me to do more than to tell them that, in my opinion, they have made the best selection possible. For twenty years I have been familiar with University College, and intimately connected, as student and teacher, with its medical school; and I believe I may honestly say, without desiring to draw comparisons unfavourable to other schools, that there are many advantages attending the study of medicine at a great college of arts and science, such as this, which cannot be overestimated. Let advertisements say what they will, I maintain that it is impossible for those sciences which form the basis of medical education, and in the absence of which the whole art of healing lapses into a mere mass of shallow empiricism, to be thoroughly and effectually taught elsewhere than in institutions which are mainly devoted to their study and teaching. And when with these advantages are combined the soundness of clinical instruction and thoroughness of clinical and pathological investigation which have always characterised the work at the hospital which is connected with our school, I have not the slightest hesitation in affirming that you will have no reason to regret the choice you have made. When she looks back along the ranks of her *alumni*, observes them occupying important positions in the profession, welcomed upon the staffs of other hospitals and medical schools both metropolitan and provincial, fulfilling the important duties of officers of health and other public appointments throughout the length and breadth of the land, each and all pursuing their profession with pleasure and with profit—even although the profit is, in some cases, more to others than themselves—what wonder that Alma Mater is proud of her children, and that they retain a feeling of affectionate attachment to her? That this feeling of pride and loyalty should exist as it does, and that it should be gathering in force as the number of those who have received their education within these walls is steadfastly increasing, cannot but be a source of satisfaction to one and all of us who are permanently placed here, seeing that in the existence of such a mutual attachment lies the best hope for the future prosperity of our institution.

I now pass to that portion of this address in which the author is privileged to put forward his individual views upon some subject connected with the study or practice of medicine—a privilege which is conceded to him in consideration, I suppose, of the fact that his holiday is curtailed, the restoration of his nerve-force arrested, his life for at least a week made burdensome to himself and those near him, by the thought and preparation necessary for the fulfilment of this important function. I propose to avail myself of that privilege by disburdening my mind of certain ideas relating to the subject of medical education, which have long been fermenting there—a subject which is, indeed, well worn, but which has the advantage that there is always something new to say regarding it, and respecting which, it is admitted by all—not even excepting the General Medical Council—that there is abundant room for reform.

In offering suggestions as to the course which ought to be pursued by those who seek to become qualified for admission to the medical profession, a commencement is generally made from the time of leaving school; and the recommendations as to the way in which a student's time should be employed, leave out of account that most important period of his existence during which he is subjected to the wholesome restraint of strict discipline. I shall venture, however, to go further back, and to tender a few suggestions as to the best way in which he may be employed in laying a thorough foundation for what may be more properly and technically termed his medical education. For, in considering this matter of education for the medical profession, we must, first of all, understand clearly what it is that the education in question is designed to attain. It is important, above all, to remember that it is education for a profession, and not for a

trade, that is required; and, more than this, for a liberal and learned profession. There is no saying more true than that of which we were reminded by my distinguished predecessor, in the introductory address which he delivered here a few years ago, that medicine is "the worst of trades, the best of professions." For those who desire to obtain a qualification for the sake of practising medicine as a trade, any smattering of learning will suffice; the more superficial and easily acquired the better; and the only movement towards the reform of medical education that will satisfy them is one of retrogression. The continued existence of persons of this way of thinking is probable, from the cry which is occasionally raised that the standard of medical education is too high; that the time occupied in acquiring knowledge is too long; that the cost of a medical education is too great; that a qualification should be granted easily, and should rank as the degree of an university; that the "guinea's stamp" should be used for baser metals. Of those who think thus, it is not probable that there will be any here present; and this is the more fortunate, because the opinions that I shall have to put forward are likely to be in no way in consonance with their views. If it be admitted that medicine should be practised as a profession, it must further be conceded that those who intend to practise it ought, first of all, to be educated gentlemen; in other words, they ought to be gentlemen by breeding, and to have had the ordinary education of the class to which they belong. This is no less desirable for the profession of medicine than for the church, the army, or the law. There should be the same acquaintance with classics and mathematics, the same knowledge of the English language and literature, of history and of geography, and of one or more modern languages, which are regarded as forming the essential elements of the education of an English gentleman. I do not myself think that a boy who, either by his own choice or that of his parents, has been destined to pursue a medical career, should, while he is at school, depart in any way from the ordinary school curriculum. It is sometimes thought proper, in such a case, to permit a boy, whilst still at school, to commence the study of natural science, even of physiology and anatomy, to the neglect, in most instances, of Latin and Greek, or of some other subject of the ordinary course.

In my judgment, this is a mistake. The small amount of science which is thereby acquired, is easily picked up after leaving school; and it is even not unlikely that much of what is learned at school may afterwards have to be unlearned; whereas the loss which will have resulted from the neglect of the classics may be much more serious than is frequently supposed. There is always time and opportunity for obtaining the necessary knowledge of science after leaving school, but the opportunity of acquiring a knowledge of Latin and Greek never recurs, and if it be lost, be sure that, in the after-studies, the loss will be many a time deplored. "Stinks," as science is euphoniously termed by the schoolboy, is popular with idle boys because it involves less labour than the preparation of a Latin or Greek construe; but there is no profession in which this labour will better pay in the long run than that of medicine. And the reason is not far to seek. Almost the whole of scientific and medical nomenclature is derived from these languages, and very largely from the Greek. I take up a book at random; it happens to be a work on physiology, but the fact would be just as strikingly illustrated by one on anatomy, botany, zoology, medicine, or any other science. Turning over the pages carelessly, I come in succession upon the terms hæmatin, kymograph, chondrin, notochord, sphygmograph, stethograph, ophthalmoscope, tachometer, ganglion, myosin, amylolytic, proteid, pleura, cardiac. It is difficult to find a term which has not been taken from the Greek. To those who are completely ignorant of this language, these sounds convey no meaning; they are merely names to be learned

parrot-like, and are often confused with one another when somewhat similar in sound, a mistake which would be impossible were the real meaning understood. For, in that case, the name would recall not only the thing itself, but its situation or composition, or the use to which it is applied. On this account alone, I should be of opinion that the omission of Greek from the preliminary education of a medical student is greatly to be deplored. I believe that the small additional labour involved in acquiring some knowledge of that language, would prove a true economy in the end; and even if it should be the case that a certain number of lads were compelled, by their inability to acquire that knowledge, to select some other profession, it would be better both for the profession and for them, better for the profession that the overcrowding which now exists should be mitigated, and better certainly for them that they should be turned back at the commencement of their career, rather than run the risk of eventually, after the expenditure of much time and no small amount of money, failing, as a few unfortunately do fail, to obtain the desired qualification.

I remember last year listening with much amusement to an after-dinner speech by my learned and witty colleague the professor of Latin, in which he reported a conversation which he had overheard in the professors' common-room between two of his scientific colleagues. They were discussing the advisableness of altogether abolishing Latin and Greek as subjects of ordinary education, but they eventually came to the conclusion that it was, on the whole, desirable for so much of these tongues to continue to be taught as might facilitate the understanding of scientific language. I do not know who were these colleagues of Professor Church; certainly I was not one of them, although it may be thought that there is some resemblance between the conclusion they arrived at and the argument I have been endeavouring to urge in favour of the retention of Latin and Greek, and especially the latter, for Latin has not yet come to be regarded with so ruthless an animosity as Greek, as essential subjects in the early education of a lad who is intended to become a medical man. But the resemblance is superficial only, for although I would have him pursue the knowledge of those languages for the better understanding which that knowledge will afford of the construction of his own language, and the elucidation of scientific terms, I would none the less urge their pursuit for the sake of the languages themselves, for the pleasure which may be derived from the study of a great and ancient literature, and for the importance of the mental training which their study is peculiarly competent to impart. It is not given to everyone to attain such an amount of proficiency in the Greek and Latin as to be able to obtain the same pleasure from their perusal as from that of a poem or narrative in his own language; but even if the ulterior object be not attainable, the intermediate benefits to be derived need not therefore be neglected.

Many public schools now boast the possession of an institution which is termed the "modern side." This institution is supposed to be a sign of progress, and one of the chief indications of this progress purports to be afforded by the fact that Latin and Greek, if not banished altogether, are rigidly subordinated to modern languages and science. For my own part, I should be very doubtful about recommending any boy of mine who was intending to become a doctor, to the modern side. Doubtless, a knowledge of French and German would be beneficial in preparation for the medical profession, but scarcely the kind of knowledge which is usually acquired at an English school. An occasional two or three months of holiday-time spent in France and Germany—not in Anglo-American hotels, but amongst real Frenchmen and real Germans, would do more towards the acquisition of the kind of knowledge which is required—the ability

to speak and read the languages fluently—than as many years on a modern side. I have known many boys who have enjoyed all the benefits of the modern side of a large public school, and have generally remarked that, whilst they have to the full displayed the deficiency in knowledge of the classics which was to have been expected from the circumstances of the case, the compensating proficiency in French or German and natural science which they were to have exhibited, was not by any means markedly apparent.

I do not wish to be understood to be in favour of excluding the teaching of science from schools. Some there no doubt are in which the elements of natural science are efficiently taught. But, even in these rare instances, I do not think science should be touched until a sufficient knowledge is acquired of the ordinary subjects of a general education. It is only during the final period of school-life that they should be allowed to be taken up, and then they should not be subordinated to any other branches of study, but made the principal objects of attention.

If this course be followed, I see no objection to the commencement of the study of physics and chemistry, and even also of biology, whilst still at school. But there are very few schools which can afford to possess the necessary laboratories and appliances for the effectual teaching of these subjects; nor are there likely always to be found in schools teachers whose familiarity with all these sciences is sufficient to enable them to impart a clear idea of essential principles without burdening their teaching with unessential details.

A friend of mine who has had some experience in examining in biological science in the local examinations of one of the universities, has furnished me with some amusing illustrations of the kind of science which is often picked up at school, the answers, be it understood, being all given by candidates—boys and girls—over the age of 16. Being asked, what is meant by reflex action? one candidate, who probably had not altogether neglected his classics, answers that it is "the action of bending and bending back into the former position of different particles; the particles that act thus are generally fine and hair-like." Another candidate describes it as "the action of the muscles when they work forwards and backwards. Examples: stomach of ruminants and the heart." Another says, "by reflex action, we mean the action of the thumb, which is opposed to the fingers." Another, who is evidently weaker in classics than the first, states that it is "the flowing back. The impure blood is taken to the heart and purified; instead of flowing on, it returns by the auricles into the veins from which it has come." Another candidate mentions the curious fact that, "in reflex action, it sometimes happens that the blood goes from left to right; then it clogs, and the person ceases to live." Asked for information about the blood, one candidate gravely states that "the lungs mainly propel the blood through the body, and send it to the heart;" another that "the chief function of the blood is to carry air to the lungs;" while yet another makes the undoubtedly correct statement that "arterial blood is of a bright red colour," but adds the somewhat doubtful appendix that "some think this is due to hæmatite."

The structure and functions of the olfactory organ are treated by one candidate at considerable length. "The nostril of primates is situated in the centre of the face, and divided into two partitions. This organ is connected with the mouth and other senses, and fulfils the duty for which it was formed. In the cetacea, or whales, the sense of smell is produced by a very small nostril, which, when annoyed, the animal can use as a sort of defence. With and from this organ, it can spurt out great jets of water with such force that they are often very dangerous." Interesting information is afforded regarding fishes. We are told that "they do not generally suckle

their young ;" "their manner of bringing up their young is utterly at variance with any mode which mammalia, birds, or reptiles adopt with regard to their offspring ;" "many fishes are obliged to rise to the surface to obtain water ;" "their eyes are placed at the sides of the head, whereas in mammals the eyes are directed forwards ; also in owls." We are further informed that the notochord "is so called because it is not a cord," and that "it is important as giving the greatest flexibility to the body ; at the same time carrying on the function of respiration." The function of the muscles, according to one candidate, is "to form a pad between the bones to prevent them from rattling." With regard to the amœba, one candidate describes it as "living in the sea and eating shells ; it has the power of squeezing small insects to death." Another says, "amœba are aquatic animals ; they belong to the class Rhizoba. They have a water-vascular system, and a system of nerves composed of ganglia. They are without boues. Their intestines are of a simple character." Doubt is thrown upon oue of these assertions, however, by another candidate, who declares that "many deny that the amœba has any nervous cords." Whilst another candidate, of the gentler sex, dealing with the process of reproduction of the amœba, states that "the nucleus and nucleolus, when present, are in the same individual, and by their coercion fresh animals are produced."

Very curious pieces of information are elicited by a question on the geographical distribution of animals, such as the statement that "edentates are suited for grazing, and would be found mostly in regions resembling the British Isles." Mark the caution of that "would be found," and contrast it with the hardihood of the next one : "edentates are common in London houses."

These are only a few instances, out of many which could be given, all tending to show that the kind of scientific knowledge which is frequently acquired at school, is far too diffuse and inexact to be of much value, and too often leads only to the remarkable confusion of mind, which is exemplified in the answers I have quoted above.

Whilst I am by no means of the opinion that a boy who is intended for the medical profession should commence the study of natural science whilst still at school, I feel, on the other hand, that it is impossible to put the study of mathematics upon too high a pedestal, as a subject of preliminary training. Be sure that the time which a boy devotes to this study will never be lost. It is invaluable for the bringing up of the mind to that exactitude of observation and precision of statement, which are essential to all truly scientific observation ; and it must be borne in mind that every case which comes under a doctor's care partakes of the nature of such an investigation. Mathematics form, moreover, the basis of all the physical sciences, so that, without an adequate understanding of the one, a proper comprehension of the others is impossible.

I think, then, that every boy who intends to study medicine should, at the least, possess, before leaving school, some sound knowledge of Greek and Latin, and a thorough grounding in mathematics ; if he has also been able to acquire a certain amount of proficiency in French and German, so much the better.

After leaving school, it should be obligatory upon every student to devote at least one entire year to the study of those sciences—physics, chemistry, and biology—which are immediately preliminary to what are usually classed as the more strictly medical sciences. For this purpose, he should go to some college—to Oxford or Cambridge, University or King's, the Owens, the Firth, or the Mason—anywhere, in short, where these sciences are thoroughly taught in properly provided laboratories and under recognised teachers.

It is astonishing that not only the desirableness, but the absolute necessity, of this preliminary scientific training has not long since been

insisted upon by those who have practically the direction of medical education. To take a lad straight from school—or, perhaps, to allow him first to waste a year or more bumping about on country roads in a doctor's gig, under the idea that he is thereby acquiring an insight into medical science—and to send him to study physiology, to say nothing of pathology, without his having acquired even the most rudimentary notions of chemistry, physics, and biology, is to compel him to learn that subject without understanding it, to rob it of all the interest it possesses, and is fatal to the future comprehension of the physical and vital problems of medicine and surgery.

From my own experience, which I am very sure could be corroborated by that of every other teacher of physiology, I can bear ample testimony to the value of a previous training in the preliminary sciences; and, if I could have my own way, I would insist upon every intending student of medicine acquiring a competent and practical knowledge of those sciences previously to presenting himself for registration. I have often heard students deplore the difficulties which they have experienced in comprehending many of the facts of physiology, difficulties which have resulted solely from previous ignorance of the simplest principles of chemistry and physics. And how is it possible to expect a student, who has never been through a course of biology, never investigated for himself the structure of a worm, nor seen a bacterium, to pursue the changes and combat the ill-effects of the innumerable parasites that are liable to infest the human frame, or to follow the development, and endeavour to stay the ravages, of the many microscopic organisms which are instrumental in the production of disease?

We next arrive at the period when the candidate becomes a medical student in the ordinary acceptation of the term, the time, that is, when he enters at a medical school attached to a recognised hospital. It is universally acknowledged that, from that time to the time when the complete qualification is obtained, four years is the very shortest period that must be devoted to the more special departments of medical education. We have, then, to consider how this period may best be allotted.

I would have the first year given up to elementary physiology, histology, elementary anatomy, and materia medica. I would have all these subjects taught more by practical work than by means of lectures, chiefly using the latter to furnish an explanatory accompaniment to the work of the laboratory and dissecting room. The difficulty of making instruction, especially in physiology, more practical, which arises from the amount of time which such practical work would necessitate, is in great measure obviated if we determine to relegate the study of the preliminary sciences to an antecedent year, for this would at once enable the student to devote almost the whole of his time during the first two years after registration to anatomy and physiology.

In considering the relative apportionment of time to each of these two subjects, we must take into account their relative importance to the student of medicine. The arrangement of time which at present obtains is apparently based upon the assumption that anatomy is the foundation upon which all the superstructure of medical and surgical science is reared, whilst physiology is of comparatively little consequence to the future surgeon and physician, and requires comparatively little effort to master, and needs, therefore, an expenditure of not more than one-sixth the time which is claimed for anatomy. This assumption could only be justified if the object of medical education were to provide physicians, not for the living, but for the dead. But since it is life, and the problems presented by the living body in health and in disease, that both surgeon and physician must encounter, it is the science which deals with life and the processes of the living

body which should form, both for surgeon and physician, the foundation of their training. It is infinitely more important that the principles of physiology should be learned thoroughly and practically, than that the student should be crammed with dry anatomical details, many of them of no possible application, and most of which are often forgotten after the examination in far less time than they have taken to acquire. I suppose I was myself at one time as well stuffed with these dry bones of anatomical learning as other students. I should be sorry now to confess how little has been retained. And how many must there not be whose experience would corroborate mine?

Instead of this absurd disproportion in the amount of time which is given up to physiology as compared with anatomy, I would have the student devote at least half his time during the first winter to physiology, leaving the other half to anatomy. An elementary course of lectures should be accompanied by practical work in a laboratory, and supplemented by tutorial instruction. The physiological laboratory—not the research laboratory, but a teaching department—should take the same place with regard to physiology that the dissecting-room does to anatomy. Each student should have his own place, and should be expected to spend a certain number of hours each day there.

No doubt, the carrying out of such a plan would entail a large amount of trouble and expense. The room which in most medical schools is dignified by the designation of physiological laboratory would be entirely inadequate for the purpose; and the building of a proper laboratory, and the furnishing of it with a sufficient amount of apparatus, would involve an outlay from the mention of which the governing bodies of most medical schools would shrink in dismay. Even in this College, which already possesses a laboratory sufficiently large and conveniently arranged for purposes of research, and for the present exigencies of teaching, we should require large additional space, and a very large amount of additional apparatus. At present, what is called practical physiology is, for the ordinary student, nothing but practical histology, often nothing but the examination of microscopical specimens, with a little practical chemistry thrown in. Here, and in one or two other places where a physiological laboratory worthy of the name happens to exist, a few students can be conducted through a tolerably complete course of practical work in physiology. But the amount of time which is required for this work, and the fact that such a course is not included within the prescribed curriculum, and is, therefore, not requisite for examinational purposes, debars all but a few from following it out. I should like to see every student made to learn his physiology in the same practical manner that he learns his medicine and surgery. But you cannot compel him to do this unless you first provide the means necessary for performing your behest. Your student can no more make bricks without straw than could the Israelites of old. You must begin by providing him with well appointed laboratories; but how is that to be done? Be sure it will never be done so long as the present ruinous system of competition between the London medical schools continues. I do not believe that any one school unassisted can afford to teach physiology to all its students, as it ought to be taught. I am sure there is not one school that does so, although, from the tone of some of the advertisements, one would think that, in this as in other matters, there was nothing left to be desired. The only hope which I can see, and that is a remote one, lies in the adoption of some system of co-operation under which, amongst other reforms, it might be arranged that the medical students of the different schools should obtain instruction in physiology at a few recognised centres, where it would be possible to make adequate provision for the practical teaching of that subject by those who are themselves engaged in carrying on physiological investigations.

Whilst the student may profitably occupy his time during the first winter session in familiarising himself with the fundamental facts of physiology and anatomy, he may devote the first summer chiefly to the study of histology, and partly to the acquirement of the rudiments of materia medica, exclusive of the action of drugs. Unquestionably, a complete course of histology, accompanied by practical work with the microscope, of such a nature that each student learns for himself and constantly practises all the more important methods of modern histology, will occupy the greater part of the short summer session. What time remains unoccupied by this may probably be most profitably employed in acquiring some notion regarding the appearance, characters, and composition of drugs. Not that this knowledge ought necessarily to form part of the stock-in-trade of every medical man, but because, in very many cases, it is still needful for the doctor to deal in drugs, especially in localities which are not populous or civilised enough to support a regular druggist. The time of a professional man is, or should be, more valuable than to be spent in bottling up medicines or preparing pills and powders, and it were much to be desired that the practitioner should be relieved of this incubus, and set free for the performance of work requiring greater skill and higher knowledge. Until, however, this change is everywhere possible, it may be necessary to require the student to obtain some knowledge, and that of a precise kind, of the general properties and appearance and methods of compounding drugs, so as to be able readily to distinguish them, and to detect adulteration. But to expand the teaching of materia medica to the extent to which it is developed by many lecturers and text-books—I can speak freely, because this has long since ceased to be the case in this College—to expect the student to remember the characters of all natural orders that contain any medicinal plants, to enter into the most minute details regarding the methods adopted in the manufacture of medicinal remedies, to rake together as much information of a miscellaneous kind as can be compressed within the limits of a course of lectures or between the covers of a text-book, and label the contents of the heap materia medica—against such practices as these we cannot raise too loud or vigorous a protest. Truly, Goldsmith might as a medical student have been contemplating the bald and venerable pate of a worthy predecessor of our professor of materia medica, when he composed the expressive lines which tell how

> "Still they gazed, and still the wonder grew,
> That one small head could carry all he knew!"

What wonder that a cry has been raised for reforming materia medica altogether away from the medical curriculum! I remember, many years ago, to have heard in this very theatre no less an authority than Professor Huxley advocating its abolition. I am not quite sure whether this bag-and-baggage policy might not eventually prove best; but in the meanwhile, both in teaching and in examinations, the subject ought to be shorn of its preposterous proportions, and reduced to its legitimate level. Materia medica is to pharmacology and therapeutics as anatomy to physiology and pathology, but it is of even less relative importance.

Let us next consider the manner in which the second year of the medical quadrennium may be filled up. Again, the greater part must be given up to physiology and anatomy. During the second winter is the time when the more recondite principles and facts of physiology may best be followed. To facilitate this, not only should the teaching be illustrated experimentally in every possible way, but it should be accompanied also by practical work of a more advanced character than that which I have supposed to occupy the first winter. In the event of any student showing a special desire and aptitude for scientific

work, an original research of a simple kind might be undertaken under the direction of a demonstrator.

Certainly not less than half the student's time during this session ought to be spent in the physiological laboratory; the rest can be retained for anatomy. It is as much as he can be expected to do to obtain adequate knowledge on these two important subjects by the end of the second winter session, even if the sciences of biology, chemistry, and physics have been relegated to a preliminary year; it is more than can be done if they are to be allowed to take up a part of the time which is needed for anatomy and physiology.

Assuming that his time has been employed in the manner here indicated, the student ought to be ready to begin attendance in the out-patient department and in the wards of a hospital by the commencement of his second summer session. There are many who advise that he should begin to attend the hospital from the time that he enters as a medical student. I would not have him enter the door of a hospital until he should have completed his anatomical and physiological training. How it can possibly advantage him to see operations which he cannot understand, to listen to lectures which are absolute Greek to him, to watch the progress of cases regarding the nature and pathology of which he must remain absolutely ignorant, I am at a loss to comprehend. On the other hand, while his visits to the hospital can do him no good whatever, so far as I can see, they are able to effect a vast amount of harm. Not only do they take him away from his legitimate work at anatomy and physiology, which, God knows, demand time and labour enough and to spare, but they inculcate the habit of idling about in an aimless manner, a habit which, when once acquired, is rarely got rid of, and, in many cases, leads too easily to the tavern billiard-table, and the pursuits which follow from this. *Facilis descensus Averni.*

But when once physiology and anatomy are mastered, and the examinations in these subjects are left behind, then, by all means, let the student throw himself, heart and soul, into his hospital-work. Let him apply his newly acquired knowledge to the cases that come under his notice, and he will find that every case will add something to the store of information which must be accumulated before he can himself enter, on his own responsibility, upon the active duties of his profession. I would suggest that, during this second summer, the student would be more usefully employed in acquiring a general insight into both the medical and the surgical practice of the hospital, than in at once devoting himself exclusively to the one or the other branch of medical science. Such an insight will the better enable him to follow the regular courses of instruction in medicine, surgery, pathology, and therapeutics, which, from this time, and during the next two years, will, in addition to his hospital-work, occupy his chief attention.

Now, I think, is the best and most convenient time also for the courses of pathology and pharmacology to come in. Both of these subjects require and presuppose a knowledge of physiology, and one of them, namely, pathology, also demands a fairly accurate knowledge of normal anatomy and histology; and the fresher these sciences are in the mind the better. But I would venture to assert that the method of teaching both pathology and pharmacology ought to be very different from what, in this country, is considered sufficient. Amazing as it may sound to a continental reader, there is not a genuine pathological laboratory attached to a single medical school in this great metropolis. They do not even, as in the case of physiology, pretend to possess one. The only pathological laboratory that I know of in London is that belonging to the Brown Institution, which institution, I may inform the intelligent foreigner, is a dispensary for dogs. "Love me, love my dog," is a proverb which must be

truly indigenous in this country, where a sentimental regard for the brute creation is reckoned a truer nobler instinct than the love and care of one's fellowmen. Our hospitals and schools of medicine may languish, and the progress of science be hindered for lack of funds, but there will never be a want of provision for our stray cats and dogs.

Pathology is at present mainly represented by pathological anatomy in the same way that, fifty years ago, the teaching of physiology was little more than a name, and consisted chiefly of some sort of anatomy. One would think that such a science as experimental pathology was non-existent; that the cultivation and study of disease-producing organisms was a form of amusement practised by a few pleasure-loving Germans; that to know what a morbid product might look like after death was the sole knowledge necessary to enable one to combat its development and progress during life. I deeply regret that University College is still behindhand in this matter; it is almost the only instance I can remember in which she has not taken the lead in the path of progress. But it is to the University of Cambridge that the honour belongs of having instituted the first chair of Pathology properly so-called, and of having made provision for the necessary laboratories. I hope that we may not long linger behind, and that the time is not far distant when we shall possess a laboratory worthy of the name, which shall be devoted wholly to pathology, and presided over by a trained experimental pathologist. Until this shall have been accomplished here and elsewhere, it is hopeless to expect that the teaching of pathology will be anything but a makeshift; and it is not to be wondered at that our students find it necessary to go to Berlin, or Leipzig, or Strasburg, in order to acquire that knowledge of pathological methods and practice in their application which they in vain seek to obtain in this country. All the arguments which I have urged in favour of the learning of physiology by practical work, apply with even greater force to pathology, for it is with pathological processes that the medical man is concerned, and pathology is nothing but physiology gone wrong.

Only inferior to the claims of pathology are those of pharmacology. Little as I would have the student's mind burdened with the dry details of materia medica, so much the more would I insist upon the importance of his acquiring a proper understanding of the action of drugs in health, so that they may be scientifically and accurately applied to combat the manifestations of disease.

It will be said that this is merely a branch of physiology, and this is true; but it is so large and special a branch, that it is necessary it should stand upon an independent footing. Like physiology and pathology, pharmacology is an experimental science, and, as such, demands laboratories fitted with the most approved instruments of research, and every essential for teaching. But where—I do not say in this metropolis, but in the whole United Kingdom—will you find a laboratory devoted to this purpose, and presided over by one who has familiarised himself with all the details of this important branch of medical science. Probably not one single room is set aside even for the carrying on of private research, certainly there will not be found any means of enabling the intending medical man to study the action of those drugs which he is afterwards, often blindly and fortuitously, to experiment with upon his unfortunate patients.

How far we are behind Germany in this matter will be evident from the circumstance that even the smallest German University reckons among its teachers a professor of pharmacology, to whose sole use a laboratory is devoted for purposes of research and teaching. But, in this country, the pharmacologist may think himself fortunate if he can obtain the grudgingly yielded licence of a Secretary of State, and a spare corner in a physiological laboratory, in order to pursue those

investigations, and conduct those experiments, which ought to be a necessary preliminary to the application of remedial agents in the human subject. How, under these circumstances, a doctor can be blamed for occasionally making himself or his patients the subject of experiment, I am at a loss to understand; for surely it is only by experimental means that the necessary knowledge can be arrived at, and the legitimate opportunities for obtaining this knowledge are, in this country, difficult, indeed, to be obtained.

I should like to see, at the same centres at which physiological laboratories are established, laboratories of pathology and pharmacology side by side with them. It is impossible that each medical school should maintain, unassisted, each its own laboratories and staff of teachers, devoted entirely to their respective subjects; and it is only by the adoption of the principle of co-operation, and the invocation of pecuniary aid from the State, that we can expect these sciences to be effectually taught. This is a string which I shall have once more to harp upon before I have finished.

During the third and fourth years after registration, the student's whole time must necessarily be taken up with surgery and medicine. I believe that the present mode of teaching these subjects in this country leaves little to be desired, although the opportunities for studying some special branches may be exceeded in some foreign cities. The fulfilment of the duties of subordinate appointments in the hospitals, and the attendance at clinical lectures and systematic courses of instruction, operations, and *post mortem* examinations, may be reckoned to absorb every available moment. Two years may seem all too little for the acquisition of that amount of knowledge of disease, and its treatment, which is to enable its possessor to be legally entrusted with the health, or even, it may be, with the life, of his fellow-men. But it must be borne in mind that the newly-fledged practitioner is rarely called upon to take the charge of a practice upon his own responsibility; nor do I think it at all desirable that he should do so. If he fails to hold a resident appointment, at either a metropolitan or a provincial hospital, he probably obtains his first experience of practice either as the assistant of an established practitioner, or in conjunction with one to whom he can readily refer in matters which have not before come within his cognisance. The work of medical education, just as it does not begin with registration, so by no means ceases with qualification. The advances of medical science are rapid, and even the physician of experience has constantly to educate himself, if he will keep abreast of the progress of the times. The period of study, to which we assign artificial limits, is but the commencement of a course of education which ceases only with life itself.

I have hitherto avoided touching the subject of examinations, and I would willingly leave them altogether out of consideration, unless it were to point out some means by which they could be avoided by the student also. But I greatly fear that, under the actual conditions of medical education, examinations are necessary. It is certainly essential that the student's knowledge should be tested, and the only way of fairly testing it, which seems at present possible, is that of public examinations. I would myself rather trust the certificate of a recognised teacher, who has throughout watched the progress of the student's work, and who has had frequent opportunities of informing himself regarding the knowledge which the student has acquired, than the report of an examiner, who sees him on one occasion only, and then under strange conditions, which, in many cases, prevent the candidate from doing justice either to his subject or himself. But it must be admitted that there are many difficulties in the way of the adoption of a change of this description; and we must probably continue for a long time to consider examinations as a necessary factor in the course of a medical education.

Under the present conjoint scheme of the Colleges of Physicians and Surgeons, five examinations are required to be passed before the candidate can obtain a diploma to practise. They are: 1. A sort of easy matriculation examination, to be passed prior to registration. 2. An examination in chemistry, chemical physics *(sic)*, materia medica, medical botany *(sic)*, and pharmacy, to be passed after registration. 3. An examination in elementary anatomy and physiology, at the end of the first year after registration. 4. An examination in anatomy and physiology, at the end of the second year. 5. A final examination in medicine, surgery, midwifery, and pathology. I would like to see certain modifications made in the subjects of some of these examinations, and in the mode of conducting others—modifications which will bring the examinations into conformity with the scheme of teaching which I have before propounded. I do not think an objection can be taken to the number of these examinations. I do not see any harm in multiplying examinations, if you do not, at the same time, increase the number of subjects of examination. If you reduce the number of examinations, you must put more subjects into each; and, if a number of subjects are grouped into one examination, there is a greater amount of difficulty in working all up to the examination-point. At any rate, if, for convenience sake, several are taken together, a student should not be rejected in all his subjects, because he fails to pass in one or two. If he has shown, in a searching examination, enough knowledge of any one subject, he should be credited with that knowledge, and not required again to pass in that subject. It is impossible for all the data which are required for an examination to be for ever kept in memory. How many of us could now pass an examination in many subjects with which we were at one time perfectly familiar?

I would have the examinations distributed somewhat in the following manner. The first would be encountered on leaving school, say, at the age of 17 or 18, when the boy should be expected to show the possession of a competent knowledge of Greek, Latin, and mathematics, and of the English language and literature, and some acquaintance with French and German, especially with the grammar of those languages. He would then proceed to college, and follow courses of instruction in chemistry, physics, and biology. In every case, examinations in the preliminary sciences should be passed previously to entering at a medical school. I would not have these examinations difficult, but so far as they go I would have them searching and practical. As in the preliminary scientific examination of the London University, of which they would collectively be the equivalent, they might be taken either together or piecemeal; the latter course in many cases would be greatly to the advantage of the student. They should be less difficult, but more practical than is the case at the preliminary scientific. No one should be permitted to register as a medical student until he could produce certificates of having passed in each subject. I regard the introduction of a thorough and practical examination of every intending student of medicine, in the three sciences of biology, chemistry, and physics, as one of the most important reforms to be introduced in medical education.

Other examinations would come during, or at the end of, the first year after registration, and would comprise the subjects of the first year of study; namely, physiology, anatomy, histology, and materia medica; and others, again, at the end of the second winter, in advanced physiology and anatomy. The examinations should be no less practical than the teaching, and they should occupy a much longer time than is now the case. To attempt, for instance, to test a student's knowledge of physiology by a practical examination, which lasts only a few minutes, is a farce that can only be justified by the fact that it

is a considerable step in advance to have instituted even the semblance of a practical examination.

A reform of this kind cannot be made without a considerable outlay. It would be needful to erect and fit out a laboratory expressly for the purpose of conducting such examinations in physiology, and they ought to be held only under the direction of those who are themselves actually engaged in physiological work. Should the munificent bequest of Erasmus Wilson result, as I sincerely trust may be the case, in the erection and endowment of a great central research-laboratory for physiology, pathology, and pharmacology, it would be easy to establish practical examination-rooms as an annex of such an institution, and the services of the permanent directors and staff of the laboratory would then be available to conduct the examinations. I believe that the adoption of such a plan would also obviate one of the worst evils of the present system; that, namely, of the inequality of the examinations, resulting from the number of the examiners, who are, unfortunately, not all cast in the same mould, and the differences in whose individualities are often painfully evident to the candidates.

The final examinations in pathology, pharmacology, and therapeutics, medicine, surgery, midwifery, etc., might, in the scheme which I have here been endeavouring to sketch, be passed as soon as the required courses in those subjects are concluded. After the main subjects had been passed, special examinations should be held in some of the more important branches, such as ophthalmic surgery, diseases of women, diseases of children, and insanity. Were the student thereby encouraged to frequent special hospitals during the latter part of the quadrennium, so much the better.

I fear the time is yet far distant when a London student shall have the freedom of all the London hospitals, and be able to betake himself to that institution where he is likely to derive the greatest benefit in any special object he may have in view. I should like to see a clearing-house system established in London, whence composition-tickets should be issued to students, entitling them to select for each term the particular school at which they might desire to study, or even the particular courses of instruction in different schools. The adoption of such a plan would be, practically, the substitution for the ten or twelve medical schools which are dotted over London, of one great association which would embrace the whole metropolis. This would probably lead to the concentration of the teaching of the scientific subjects at a few foci, and to a much more uniform dissemination of the students for subsequent clinical work than at present obtains, an arrangement which would be as advantageous to the students as to the hospitals, many of which are notoriously undermanned. It is greatly to be hoped that the scheme for establishing a teaching university in London may, if completed, result, among other things, in the carrying into effect of some plan of union such as this. That union will will be strength, in this as in everything else, is indubitable, and yet it is a melancholy fact that our London schools continue to pursue a suicidal policy of mutual distrust and opposition. Little is it to be wondered at if we compete unsuccessfully with the Scottish universities in attracting students to our classes, in spite of the enormous advantages which London ought to possess, and does, in fact, really possess for medical training.

But what if this unfortunate conflict of existing interests should prove a Gordian knot incapable of disentanglement? I would invoke the assistance of Parliament and cut it, without more ado. I would have, at one or more centres, the necessary laboratories erected and endowed by the State, and thus secure the effectual scientific training of the student; if this is assured, the clinical work will take care of itself. There is no lack of precedent for State intervention in the matter of education, and why should that intervention not extend to

medical education? Surely the advancement of medical knowledge is an object which every citizen, if only for his own and his children's sake, should be anxious to promote. But the necessary changes cannot be effected without some interests suffering, nor can they come to pass without money. A considerable expenditure is undoubtedly neeessary, and this would have to be mainly provided by Parliament, although it might be assisted by a rearrangement of a few existing endowments.

And why should not London obtain what other cities and towns find no difficulty in obtaining? We hear of building grants to Scottish universities, and of endowments to colleges in Wales and Ireland, but of any aid to university education in London not a sound. Even the fountains of private munificence run dry in London. Manchester, Sheffield, Birmingham, Dundee, no town or city in the provinces, but bears testimony, by the generous response which immediately replies to the cry for higher education, to the loyalty and liberality of its inhabitants. London alone languishes. No merchant prince opens his coffers to relieve her wants, no wealthy guild comes forward to aid the teaching of that to which its members often owe the health which is to them more precious than all their riches.

We have the right to demand from the State that aid which we cannot otherwise obtain, and which is essential to the interests of medical education in London. The amount we should require annually would be but as a drop in a bucket in relation to the eighty millions we expend on other objects. And even the initial expenditure, at the most extravagant estimate, would not exceed the cost of a single ironclad, which in ten years becomes obsolete, if it is not long previously sent to the bottom by a torpedo, nor equal half the expense of a railway, which we send from Woolwich to the Red Sea, and from the Red Sea to Woolwich, with no other result than to cover ourselves with ridicule.

But no Government of this country will give a penny for the purpose of assisting medical education unless we are unanimous and urgent in our demands. We must take example by the woman in the parable, and never cease from our importunity until we have obtained the redress of our wrong. It is useless to point to Germany, which spends half a million of money in constructing laboratories, and thirty or forty thousand a year in maintaining them in a single city, not one-tenth the size of London; or to France, which during a few years lays out more than four millions sterling upon her colleges; unless we are united in our purpose, and persistent in its advocacy. We must leave no stone unturned which may assist our efforts, we must be satisfied with nothing less than the complete fulfilment of our desires. Only in this way will it be possible for us to obtain such provision for medical education in this metropolis as shall be second to that of no city in the world.